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NOTES ON VELIGERS OF JAPANESE OPISTHOBRANCHS (6)

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With 5 Text-figures

The author has already made detailed descriptions of veligers of sixteen Japanese opisthobranchs in five papers (1960-1962) and here is presented a new paper of the same series on veligers of the following two more species: *Stiliger (Stiliger) berghi* BABA of Fam. Stiligeridae of Ord. Sacoglossa and *Doto (Doto) japonica* ODHNER of Fam. Dotonidae of Ord. Nudibranchia. The former is collected from the shore of Tannowa on the southeastern coast of Ôsaka Bay, while the latter is collected from the shore of Ôkawa situated about 8.5 km south to Tannowa and the shore of Ezura near the Seto Marine Biological Laboratory.

Stiliger (Stiliger) berghi BABA

(Figs. 1-3)

The animals of this species appear on the branches of the red algae, *Ceramium sp.*, grown near the low water mark at the shore of Tannowa in February and March. Usually several egg-masses are seen on a single alga

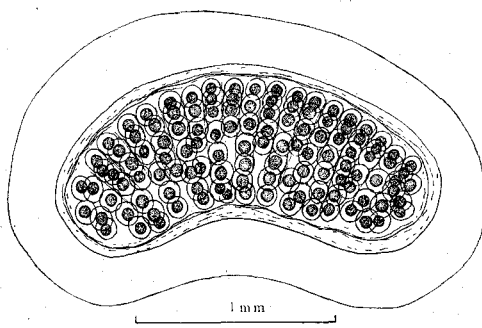


Fig. 1. *Stiliger (Stiliger) berghi* BABA.
Newly laid egg-mass.

in this spawning season. They are sausage-shaped, slightly curved as mentioned by BABA and HAMATANI in the paper of 1952, and very small measuring only 1.6 to 2.5 mm in length (Fig. 1). Being coated with rather thick gelatinous substance eggs are arranged roughly in regular spirals as in cases of such sacoglossid species as *Stiliger* (*Stiliger*) *niger* LEMCHE and *S. (S.) bood-leae* BABA as mentioned respectively by RASMUSSEN (1951) and HAMATANI (1960). The whole mass looks milky white because of the colouration of embryos. The egg-capsule is oval in outline, about 100μ in short diameter and about 130μ in long diameter. A single ovum is contained in each capsule; and it measures about 65μ in diameter (Fig. 2).

Early development: An egg-mass was laid in the laboratory on February 28, 1960 by one of the animals collected on the day before from the shore, the water temperature was 15°C in the laboratory. The slight movement of

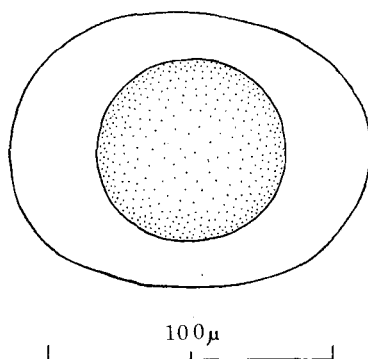


Fig. 2. *Stiliger* (*Stiliger*) *berghi* BABA.
Ovum in the capsule.

embryos within the capsule began on the fifth day of development. The embryo passed into the earliest stage of veliger on the sixth day and hatching out of larva from the egg-capsule took place on the ninth day. The room temperature fluctuated from 10° to 20°C during these observations.

Veligers: The newly hatched veligers (Fig. 3, A) are roundish in form, colourless and transparent. Its long diameter measures about 110μ and short diameter is 100μ in a measured specimen. The larval shell (Fig. 3, B and C) is sinistral and has a sculpture consisting of very minute dots over the whole surface. It is ovoid in shape, 100 to 120μ in long diameter and 70 to 100μ in short diameter. The operculum is present certainly, but unfortunately its shape was not observed. The velum and subvelum are present, both bearing several small refracting granules. The eyes are not seen, but the statocysts are distinct. The tip of foot is rounded and furnished with rather long cilia.

The foot contains some large cells in its tissue; it does not extend beyond the edge of the operculum. The oesophagus leads to the ventro-frontal side of the stomach. The dorsal wall of oesophagus is sometimes pigmented slightly in black. The stomach is placed in the dorso-ventral direction; it is

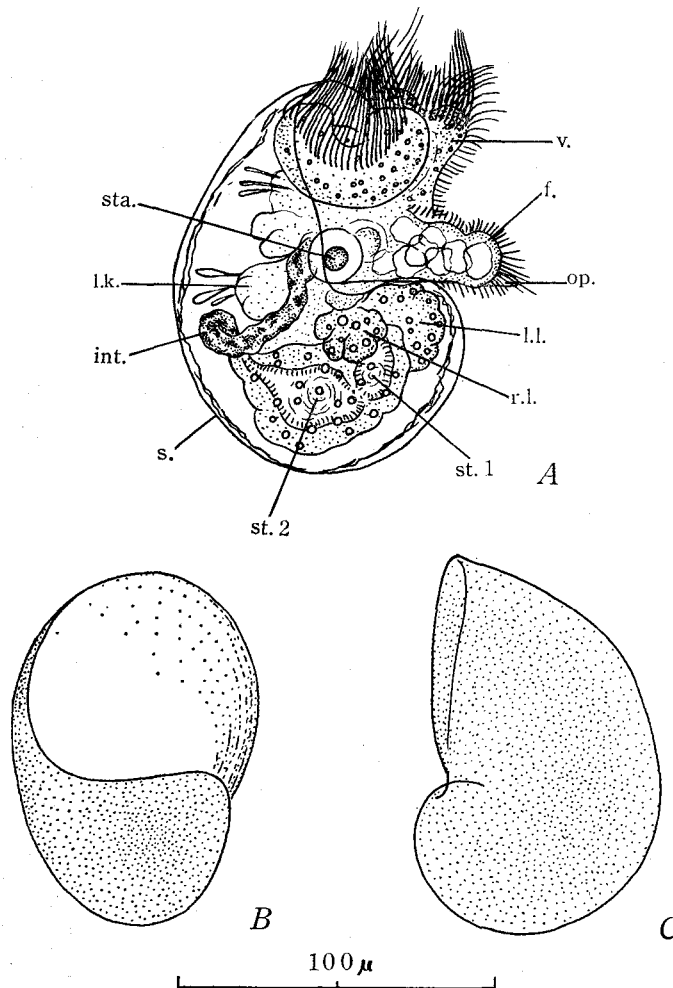


Fig. 3. *Stiliger (Stiliger) berghi* BABA.

- A. Newly hatched veliger, from the right side.
- B. Larval shell, from the ventral side.
- C. The same, from the apex.

Abbreviation: f. ... foot, int. ... intestine, l.k. ... larval kidney, l.l. ... left liver, oes. ... oesophagus, op. ... operculum, r.b. ... rod-like bodies, r.l. ... right liver, r.m. ... retractor muscle, s. ... shell, st. 1. ... first part of stomach, st. 2. ... second part of stomach, sta. ... statocyst, s.v. ... subvelum, v. ... velum.

characteristically devided into two parts just as in the case of *Stiliger* (*Stiliger*) *boodleae* described by the present author (1960). Food particles are seen rotating by the ciliary movement of the inner wall of stomach; the first part of stomach is smaller than the second part. The rod-like bodies are not seen on the wall of either parts of stomach. Two liver lobes are present as usual; they are colourless and contain some refracting granules in the tissue, the left lobe is roundish and larger than the right which may sometimes be insignificantly small. The slender intestine runs along the curved S-shaped course after it left the left-dorsal side of the stomach. The black pigments are seen faintly in the intestinal tissue. At the distal end of intestine is found the larval kidney which is colourless and transparent.

Doto (*Doto*) *japonica* ODHNER

(Figs. 4-5)

Several animals and their egg-masses were collected from the stem of the brown algae, *Sargassum* sp., at the shore of Ōkawa in September of 1959 and

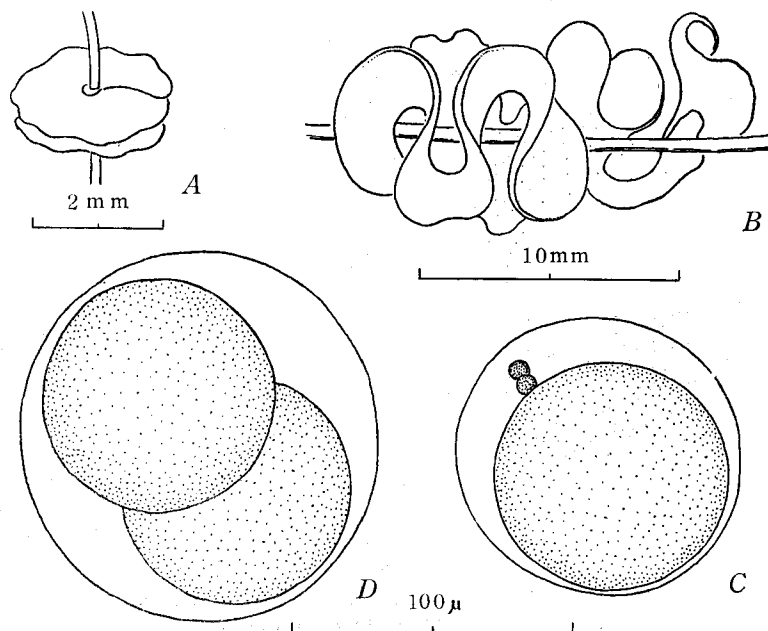


Fig. 4. *Doto* (*Doto*) *japonica* ODHNER.

- A. Egg-mass wound spirally around the stem of a brown alga.
- B. Egg-mass twined around the stem of a hydrozoan.
- C. Egg-capsule with one ovum.
- D. Egg-capsule with two ova.

1960 and from the stem of the hydrozoan, *Aglaophenia whiteleegei* BALE, at the shore near the Seto Marine Biological Laboratory in August of 1962. The egg-mass consists of a flat ribbon wound several times sinistrally or twined around

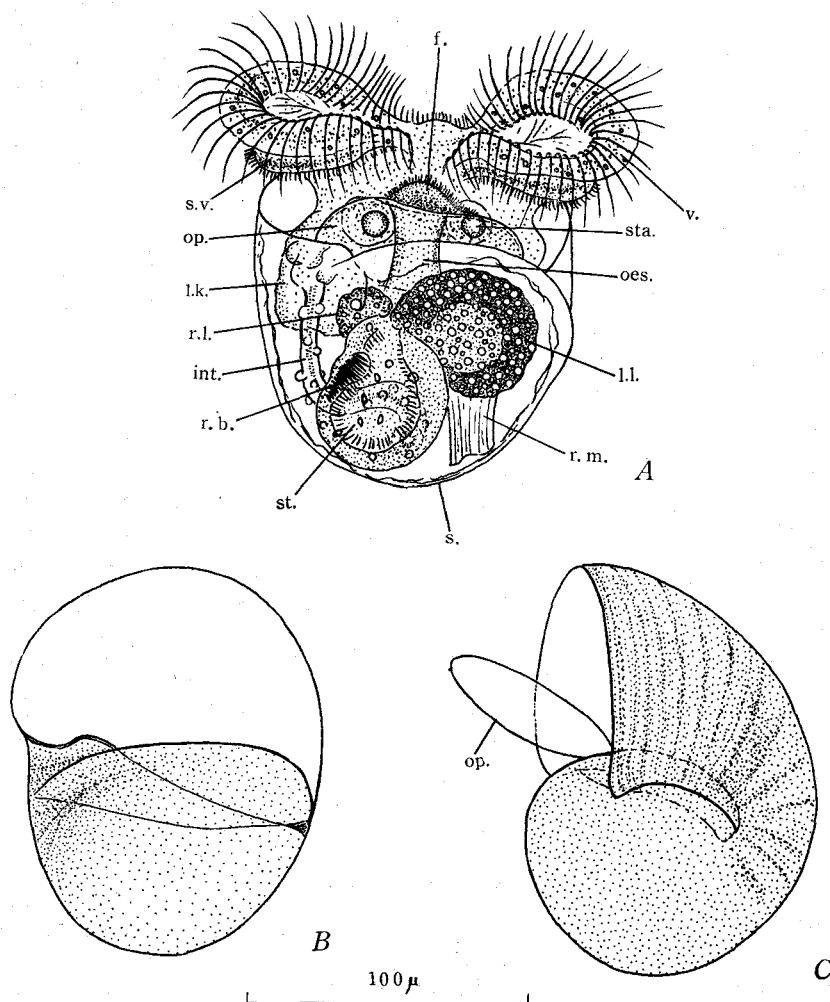


Fig. 5. *Doto (Doto) japonica* ODHNER.

- A. Newly hatched veliger, from the ventral side.
 - B. Larval shell, from the ventral side.
 - C. The same with operculum, from the apex.
- (For abbreviations see Fig. 3.)

the stem of algae or hydrozoans adhering to them by the inner edge (Fig. 4, A and B). The egg-mass is milky white in colour. The egg-capsule is nearly circular in form and about 90 to 100 μ in diameter. A single ovum is contained

in a capsule (Fig. 4, C), but rarely there may be two ova in a single egg-capsule (Fig. 4, D). An embryo has about 80μ diameter.

Early development: On September 4, 1960, some one of several animals brought in the laboratory happened to spawn an egg-mass under the room temperature of 29°C . On the third day of development embryos passed into young veligers, and on the fifth day they hatched out from the capsule. Thus it took five days from the spawning to the hatching out at the room temperature 26° to 30°C .

Veligers: The newly hatched veliger (Fig. 5, A) is round in form, colourless and transparent. Its long diameter is 147.6μ and short diameter is 144.0μ in a measured specimen. The larval shell (Fig. 5, B and C) is roundish in form, sinistral, colourless, with a 145μ long diameter on an average, and furnished with a sculpture consisting of many very minute dots. The operculum is ovoid in shape, very thin, devoid of any sculptures or spiral line, and with about 70μ long diameter. The stomach is transparent and has many rod-like bodies in the tissue of the right wall; these bodies are needle-shaped in form, this feature is quite unique differing from that known about any other kind of opisthobranchs studied by the present author. There are two liver lobes as usual, both being colourless. The left lobe is attached to the upper ventral portion of the stomach, very large and contains many refracting granules; while the right is attached near the dorsal portion of the stomach, very small and contains only several refracting granules. The slender intestine starts from the rear part of the stomach, running along the dorsal surface of the stomach in the proximal half and then turned towards the anus forming a L-like course as shown in Fig. 4, A; it is furnished with warty cells on its outer surface. Near the anus, it reaches a large, round, unpigmented and slightly contractile organ on the right side of the shell aperture, probably this is the larval kidney.

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